SOUTH FLORIDA WATER MANAGEMENT DISTRICT

High Water Emergency Operations, After-Action Report and South Dade Investigations

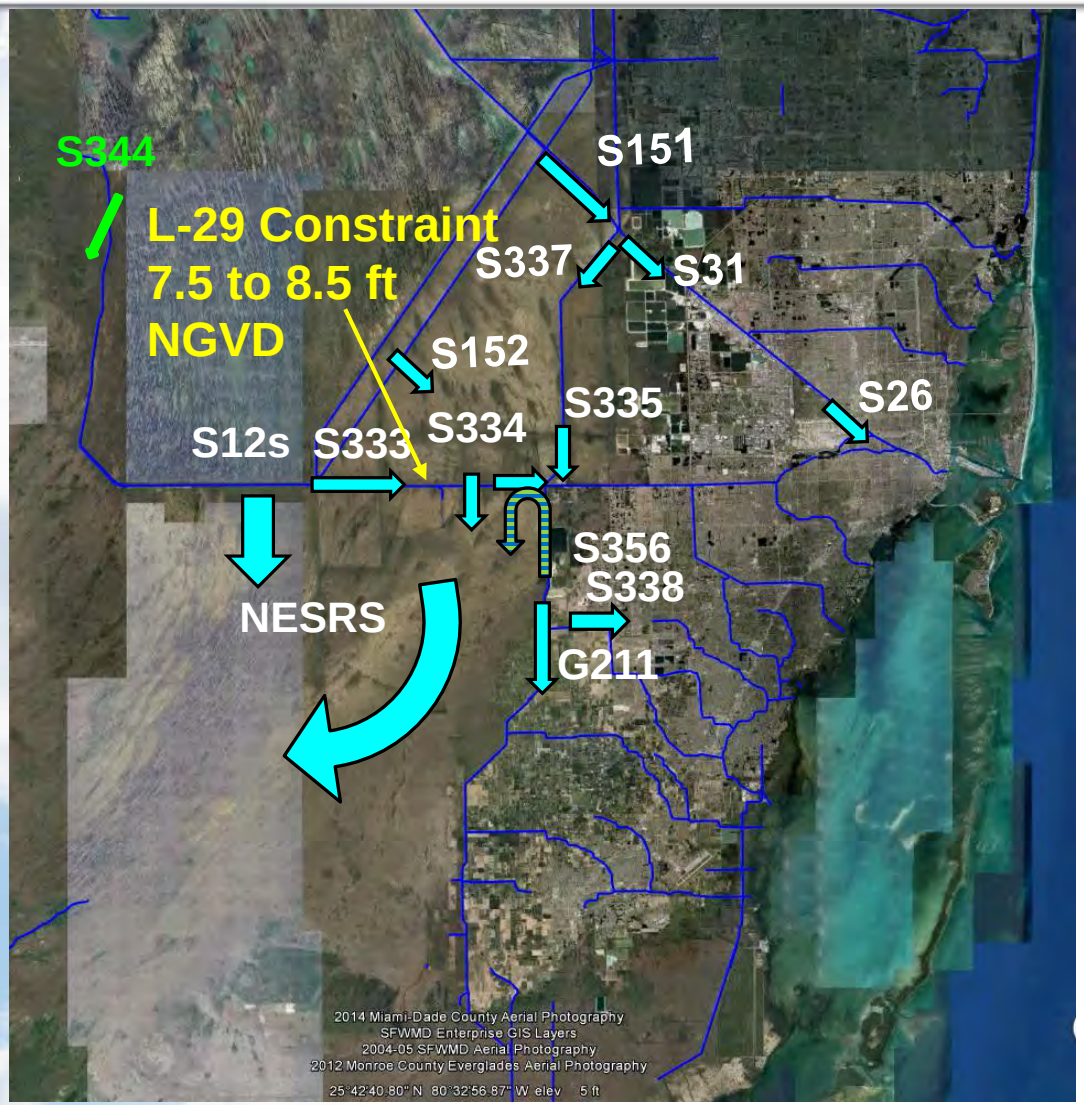
June 9, 2016

A) WATER OPERATIONS

John P. Mitnik, PE, Division Director

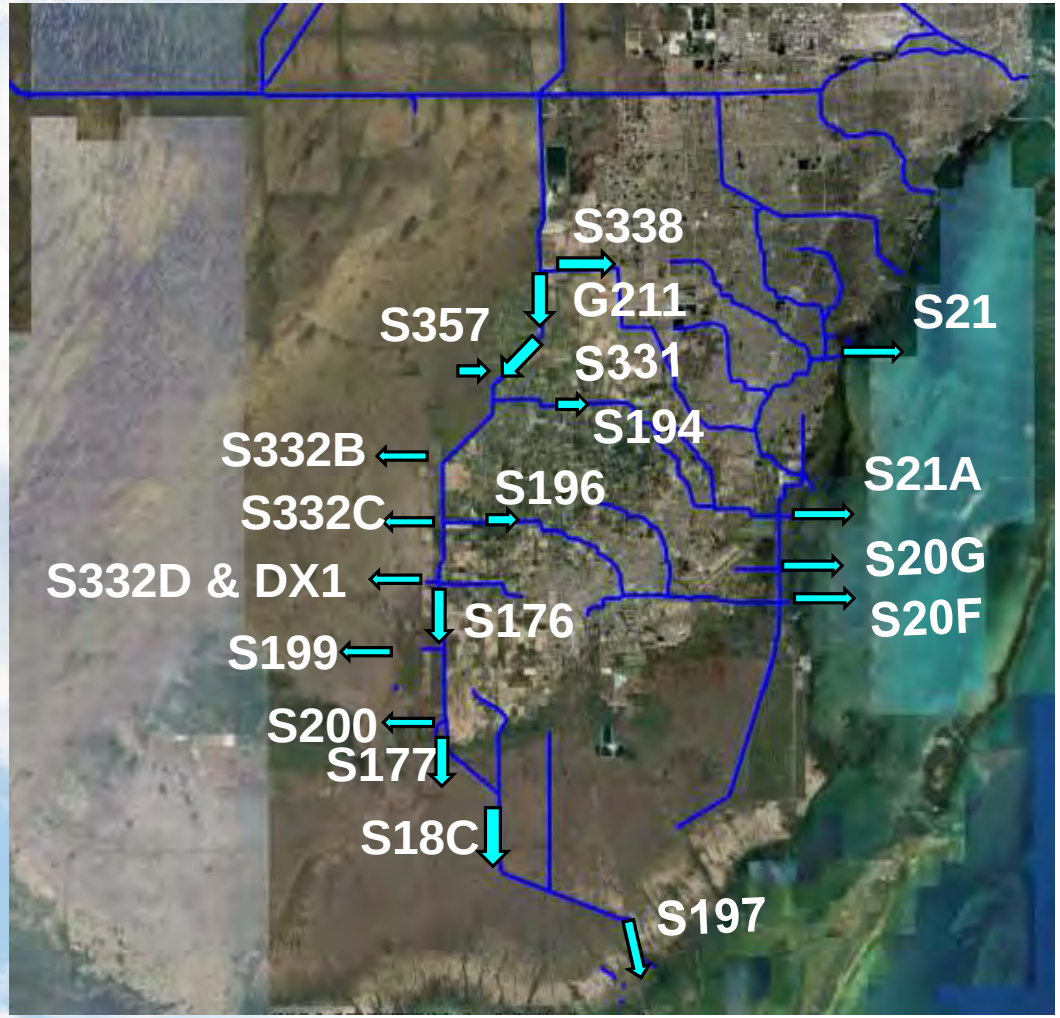
Operations, Engineering and Construction

High Water Stages in Water Conservation Area 3A



- Water Conservation Area 3A releases through the L-30 canal (S-337, S-335)
- Raise L-29 stage limit from 7.5 to 8.5 feet
- Higher flows through S-333 into L-29
- Increase flows to Northeast Shark River Slough
- Use S-334 to moderate L-29
- Temporary pumps at S-355B
- District requested and was approved by U.S. Army Corps of Engineers for deviation to increase discharge through the L-28 at S-344

Flood Protection in South Dade Conveyance System



- Canals maintained at lower stages
- Flow diversions to the coast through canals such as C-1, C-102 and C-103 have been reduced
- Pumping towards Everglades National Park and the headwaters of Taylor Slough using the S-332s and S-199
- S-197 has been operated as necessary to provide additional flow getaway capacity

Release through L-28 at S-344

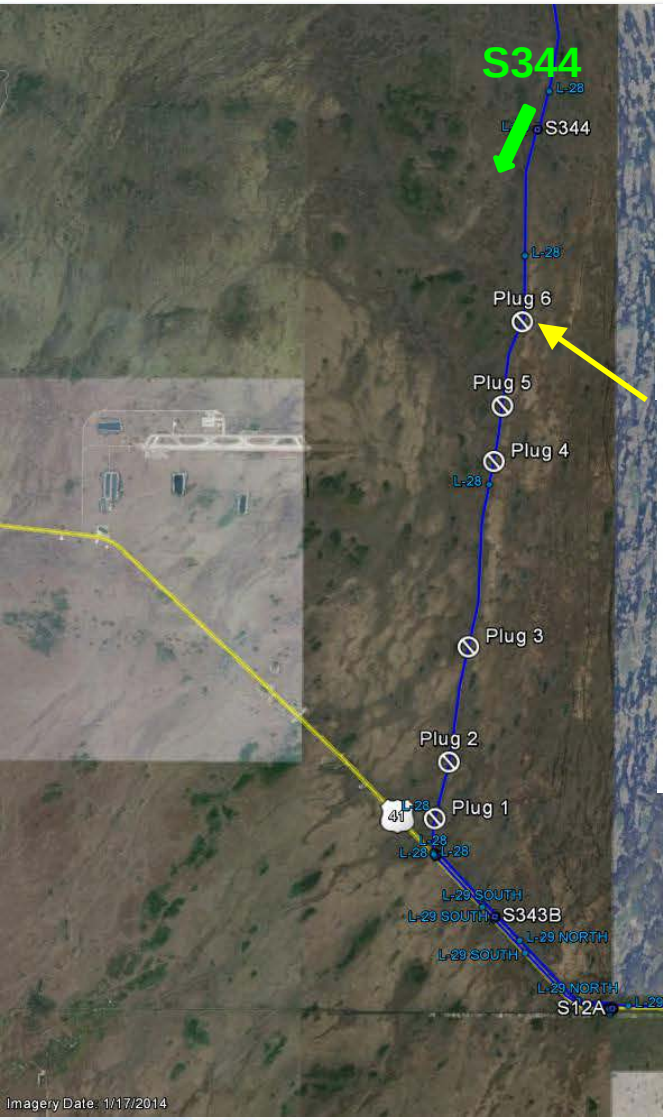
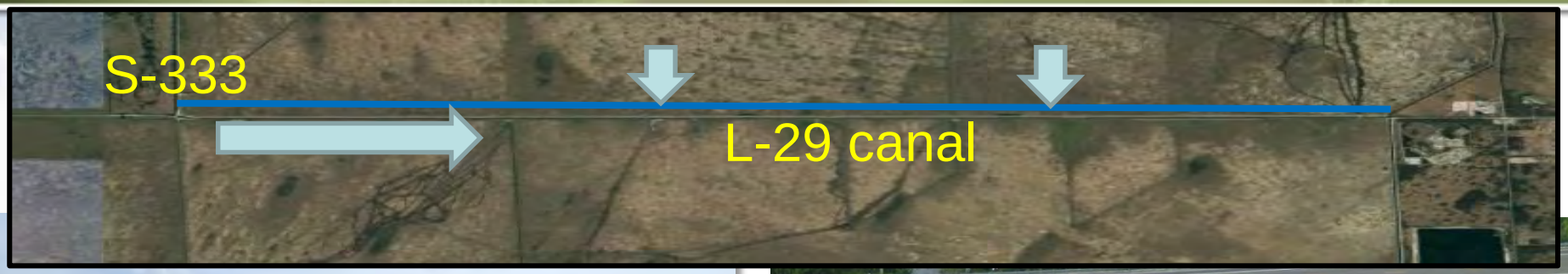


Photo #1: Plug #6, complete, aerial view from the north.

Photo #2: Plug #6, view from the southeast.

- District requested and was approved by U.S. Army Corps of Engineers for a deviation to increase discharge from Water Conservation Area 3A through the L-28 at S-344 during the Everglades Restoration Transition Plan closing period
- Requires the rehabilitation of 6 canal plugs in the L-28
- Construction work is substantially complete
- S-344 is currently open

S-355B Temporary Pumps



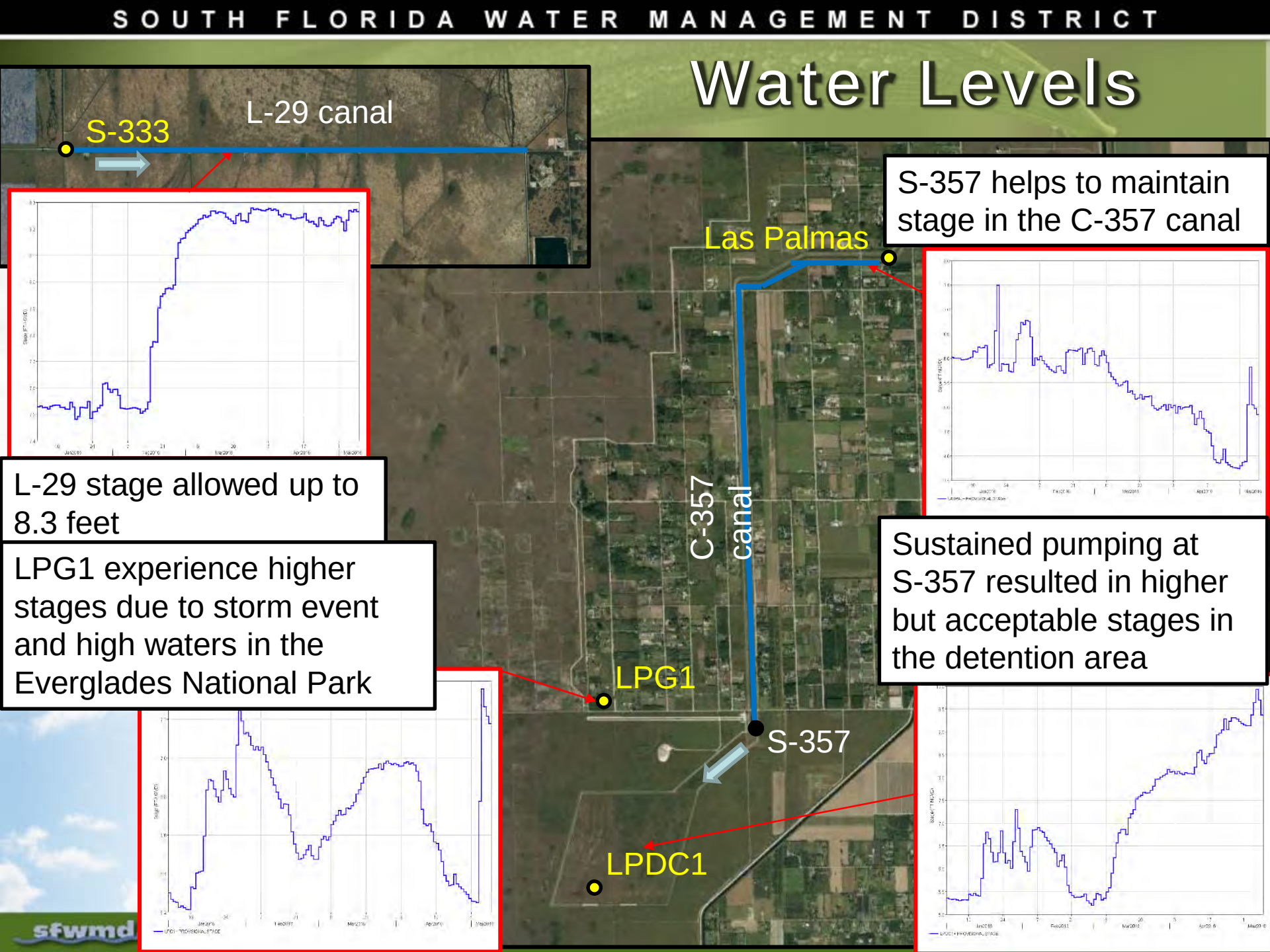
Water Levels

L-29 stage allowed up to 8.3 feet

LPG1 experience higher stages due to storm event and high waters in the Everglades National Park

S-357 helps to maintain stage in the C-357 canal

Sustained pumping at S-357 resulted in higher but acceptable stages in the detention area



Airboat Concessionaires

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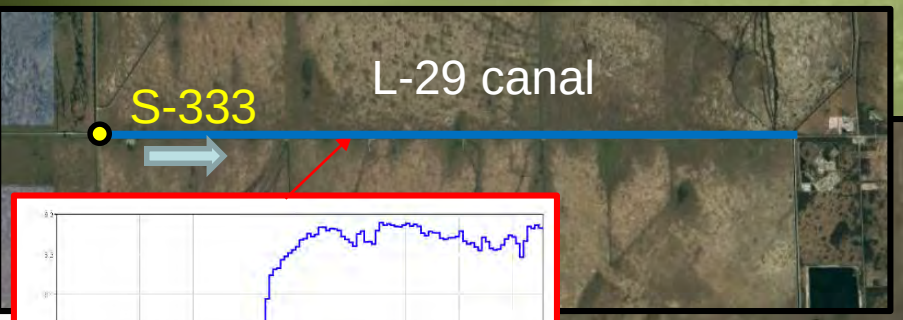
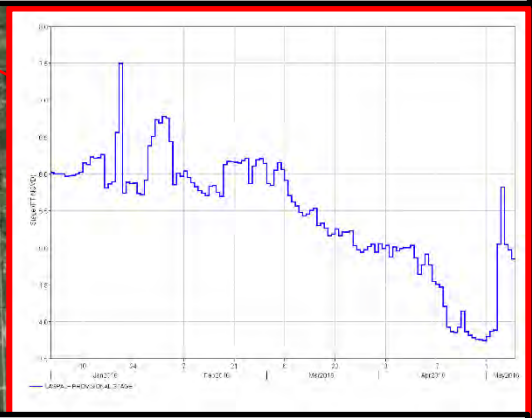
Water Levels



L-29 stage allowed up to 8.3 feet

S-357 helps to maintain stage in the C-357 canal

Las Palmas



C-357 canal

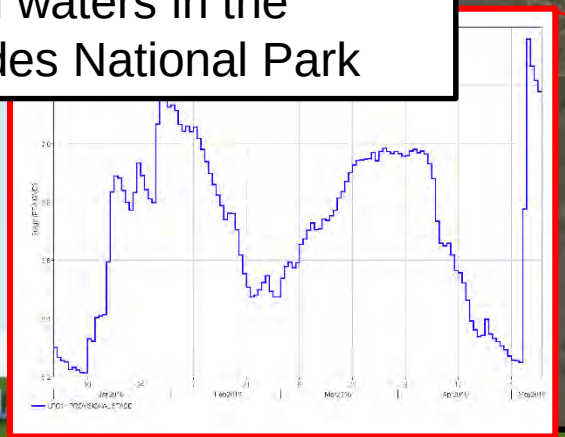
Sustained pumping at S-357 resulted in higher but acceptable stages in the detention area

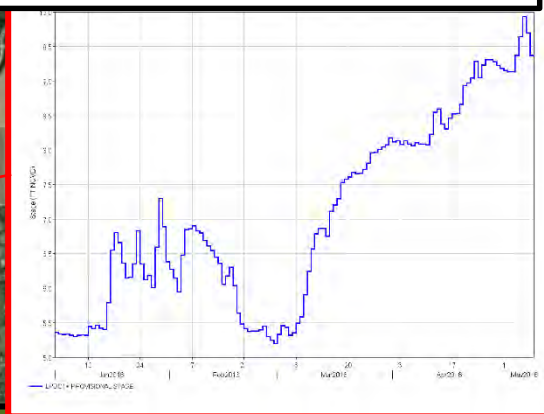
LPG1 experience higher stages due to storm event and high waters in the Everglades National Park

LPG1

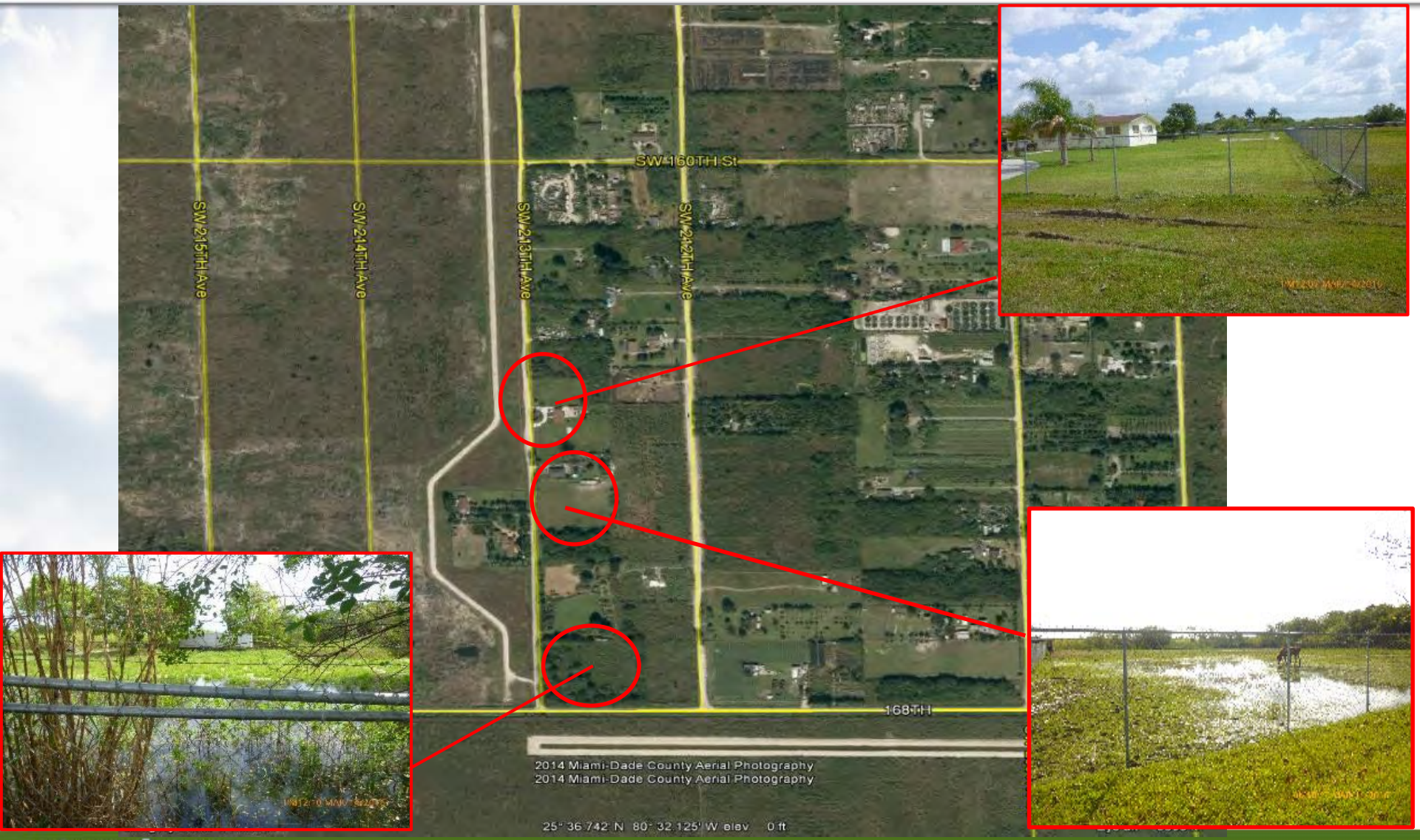
S-357

LPDC1





Water Conditions in 8.5 Square Mile Area



S-357N Temporary Mitigations in Place

Culverts at 8.5 Square Mile Detention Area

Three 36-inch Corrugated metal pipes with raisers

168TH

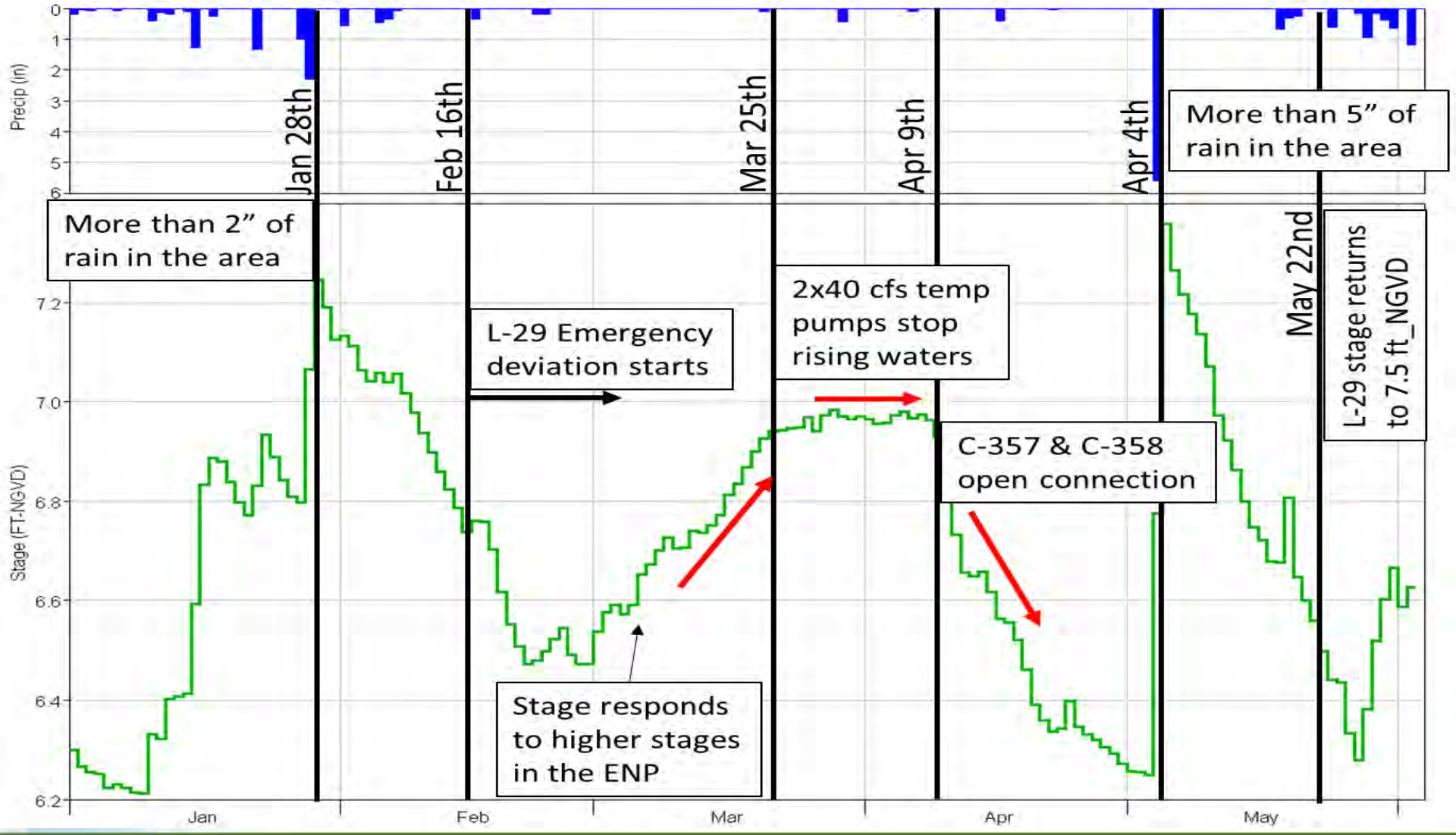
S-357

SW 209TH Ave

SW 208TH Ave

Culverts

8.5 Square Mile Area Groundwater Condition Along Richmond Drive



B) WATER QUALITY & AFTER-ACTION REPORT

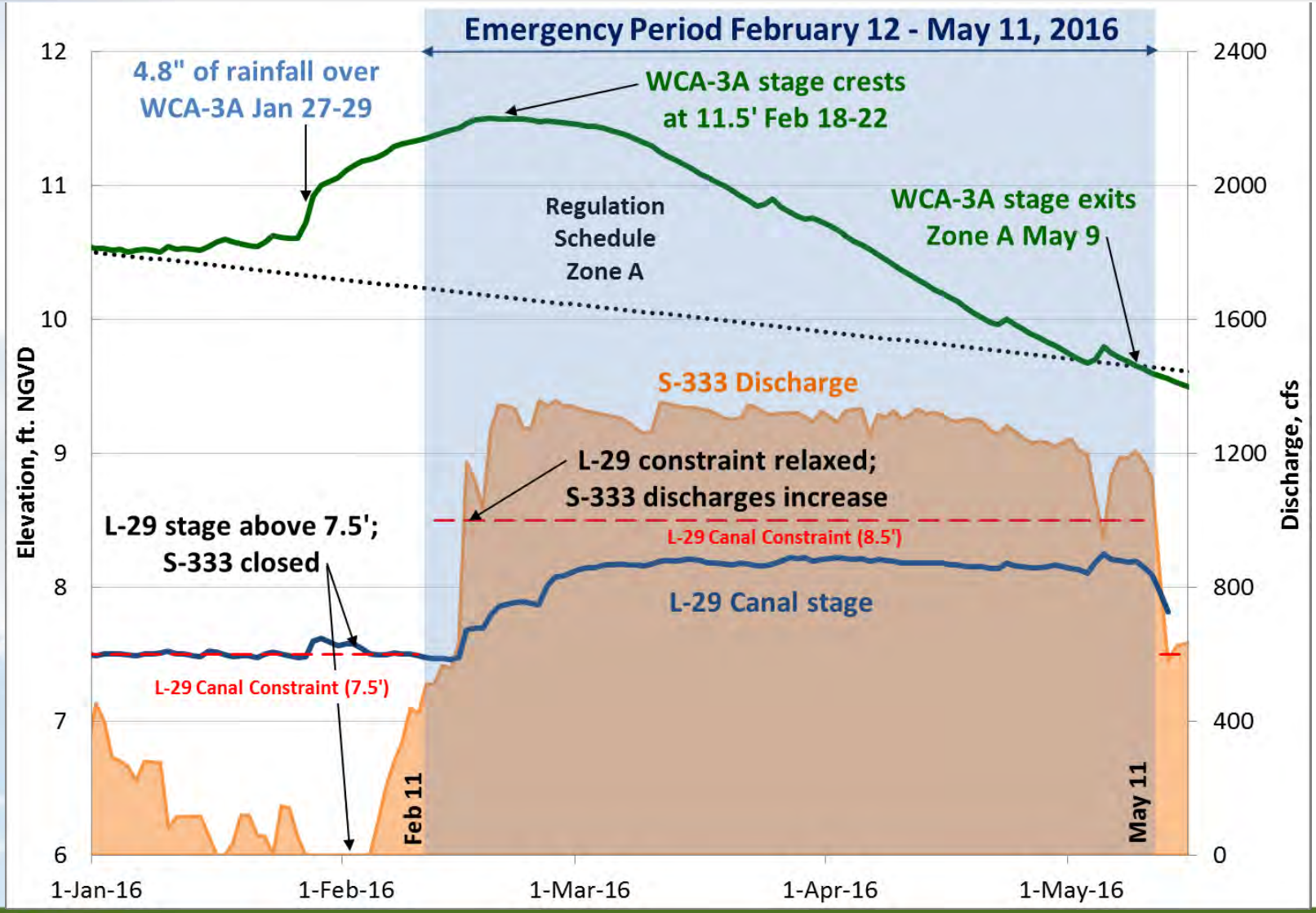
Terrie Bates, Division Director

Water Resources

Water Conservation Areas High Water Emergency After-Action Report

- Required by FDEP Emergency Order
- SFWMD to submit by July 11, 2016
- Content to include:
  - Hydrologic summary prior to Emergency Operations
  - Details of Emergency Operation activities
    - Deployment of temporary pumps
    - Construction of temporary features
    - Mitigation for higher downstream water levels
  - Response to Emergency Operations
    - Hydrology (flows, water levels; comparison with previous years)
    - Water quality (total phosphorus concentrations and loads; comparison with previous years)
  - C-111 Seepage Monitoring
  - Caloosahatchee, St. Lucie and Florida Bay flows and salinities

Water Conservation Area 3A Water Level and S-333 Discharge: Jan. 1 – May 31, 2016



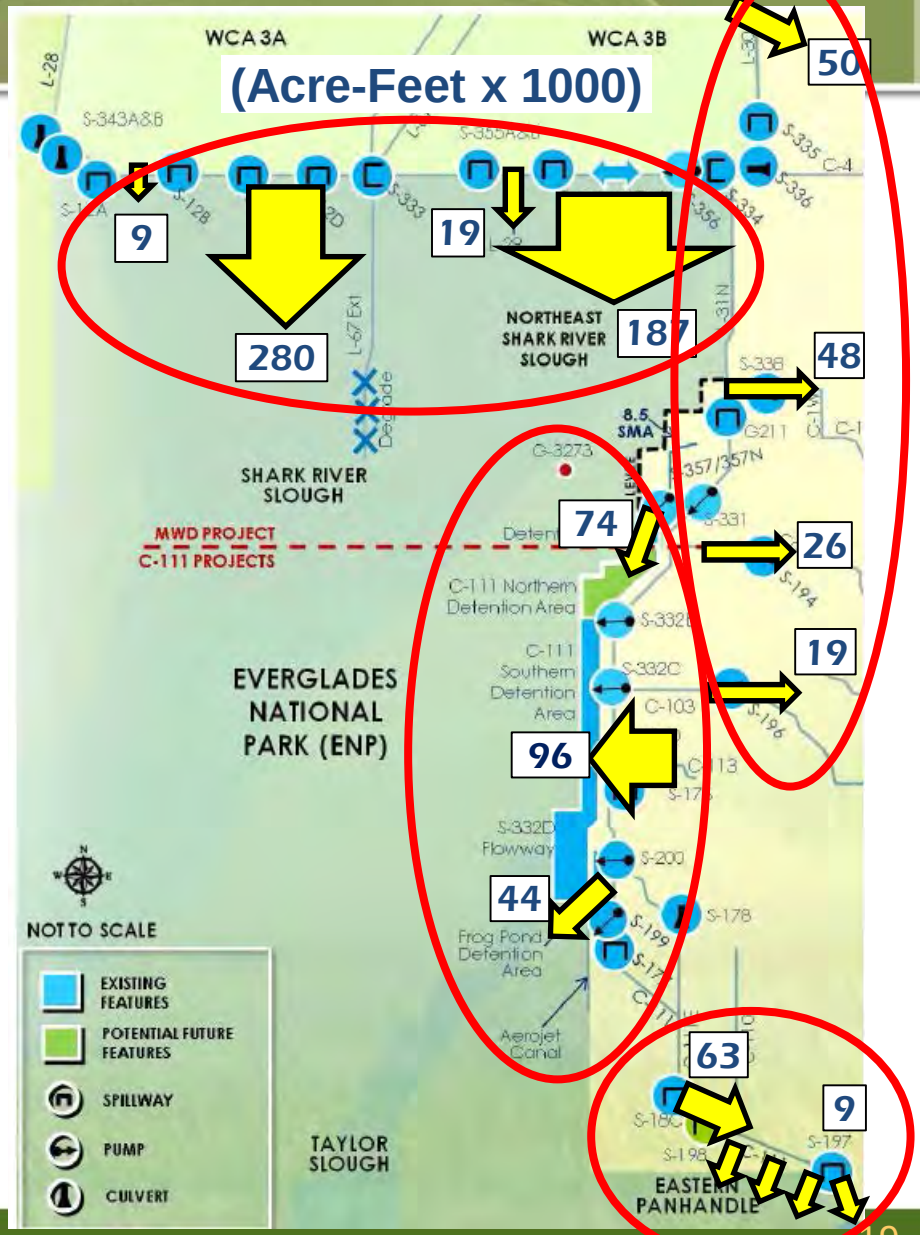
WCA-3A/3B Discharge Destinations

Feb. 12 – May 11, 2016

Preliminary flow estimates to:

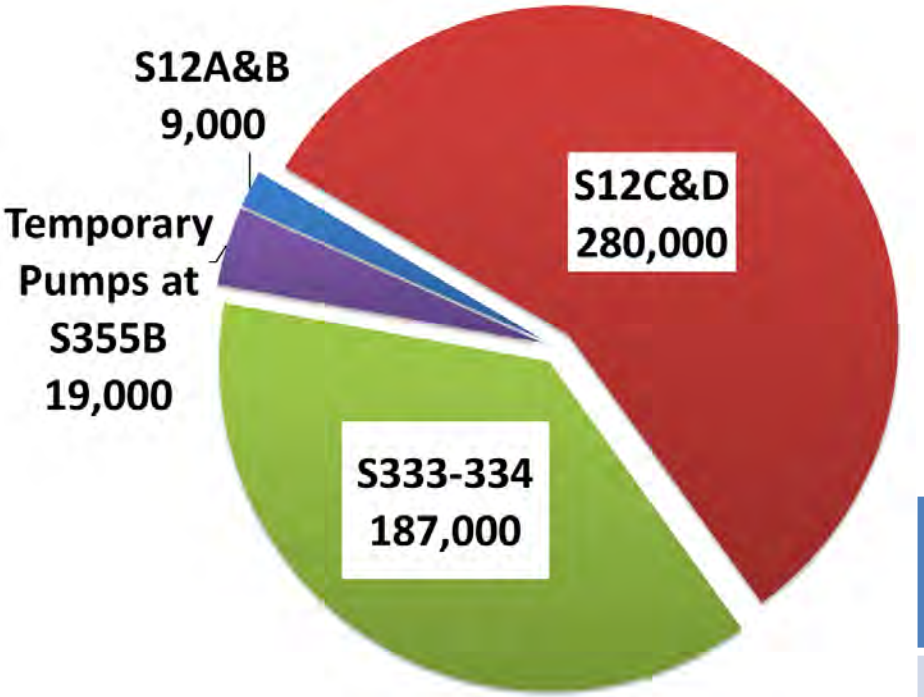
- East Coast Basins: 143,000 Acre-feet
- Everglades National Park:
  - Shark River Slough: 495,000 Acre-feet
  - Detention Areas / Hydraulic Ridge and Taylor Slough: 214,000 Acre-feet
  - S-18C (toward Eastern Panhandle and Barnes Sound): 63,000 Acre-feet
- Barnes Sound (S-197): 9,000 Acre-feet

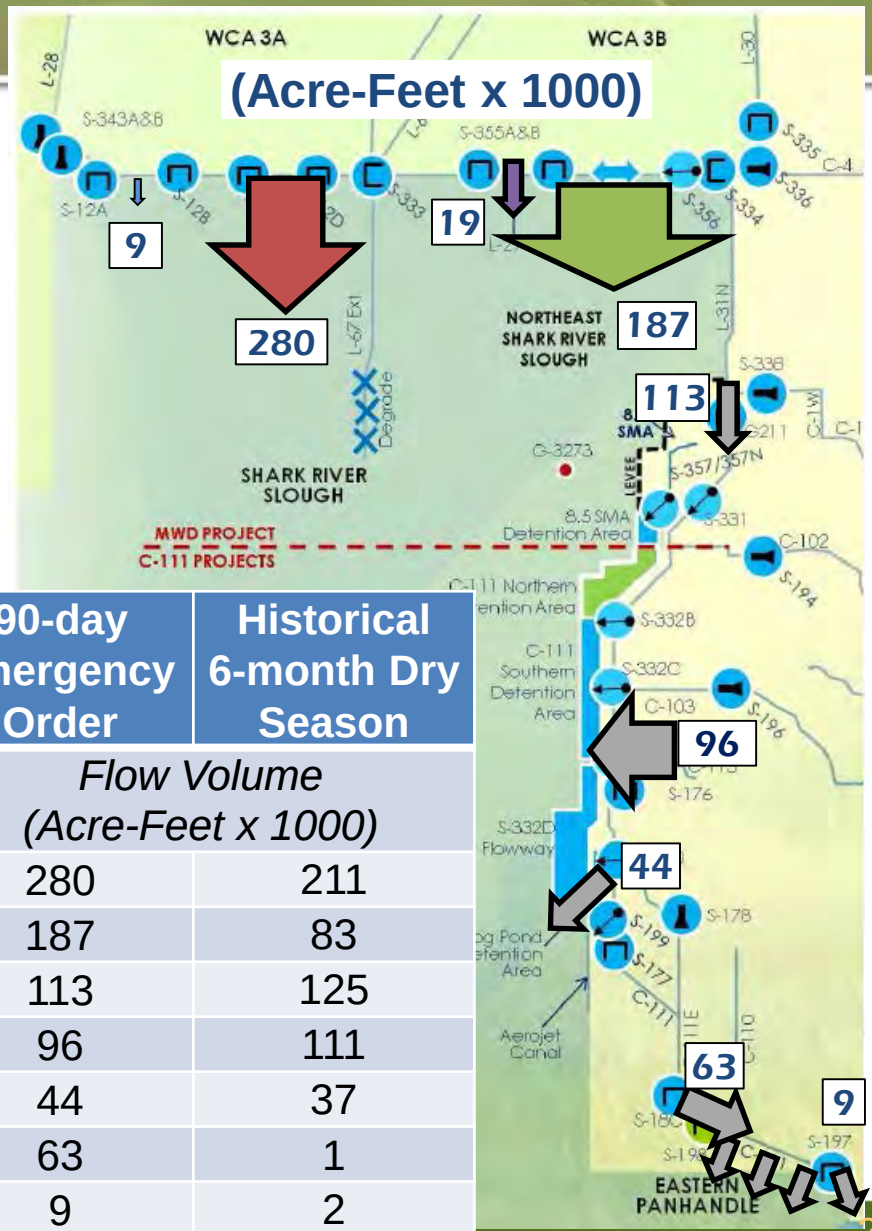
Volumes include seepage return pumping
Includes provisional flow data



WCA-3A/3B Discharge South Comparisons

Feb. 12 – May 11, 2016

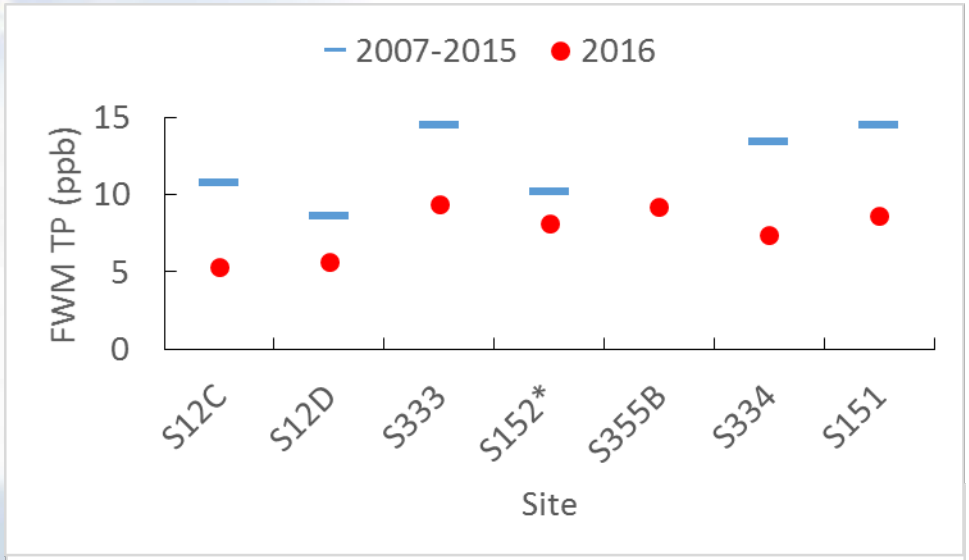


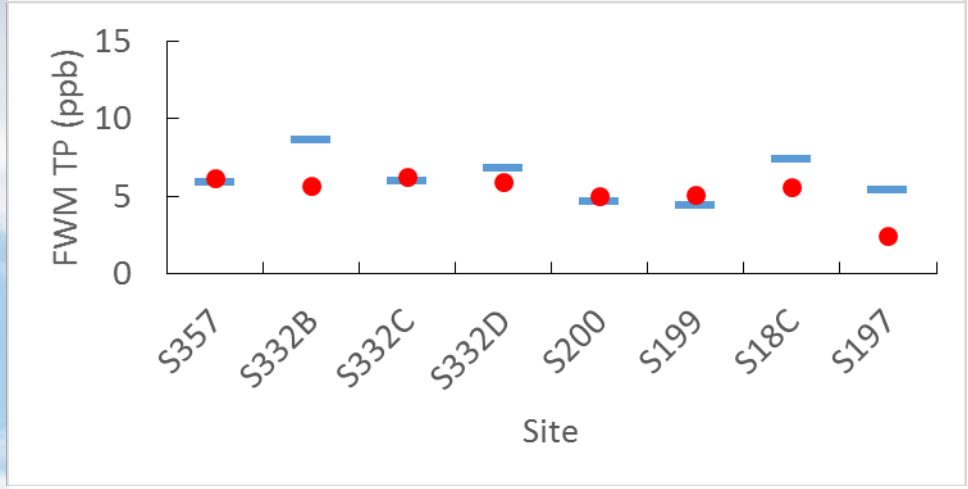


Structure	90-day Emergency Order	Historical 6-month Dry Season
	Flow Volume (Acre-Feet x 1000)	
S12C+S12D	280	211
S333-S334	187	83
G211	113	125
S332B, C, D	96	111
S199+S200	44	37
S18C	63	1
S197	9	2

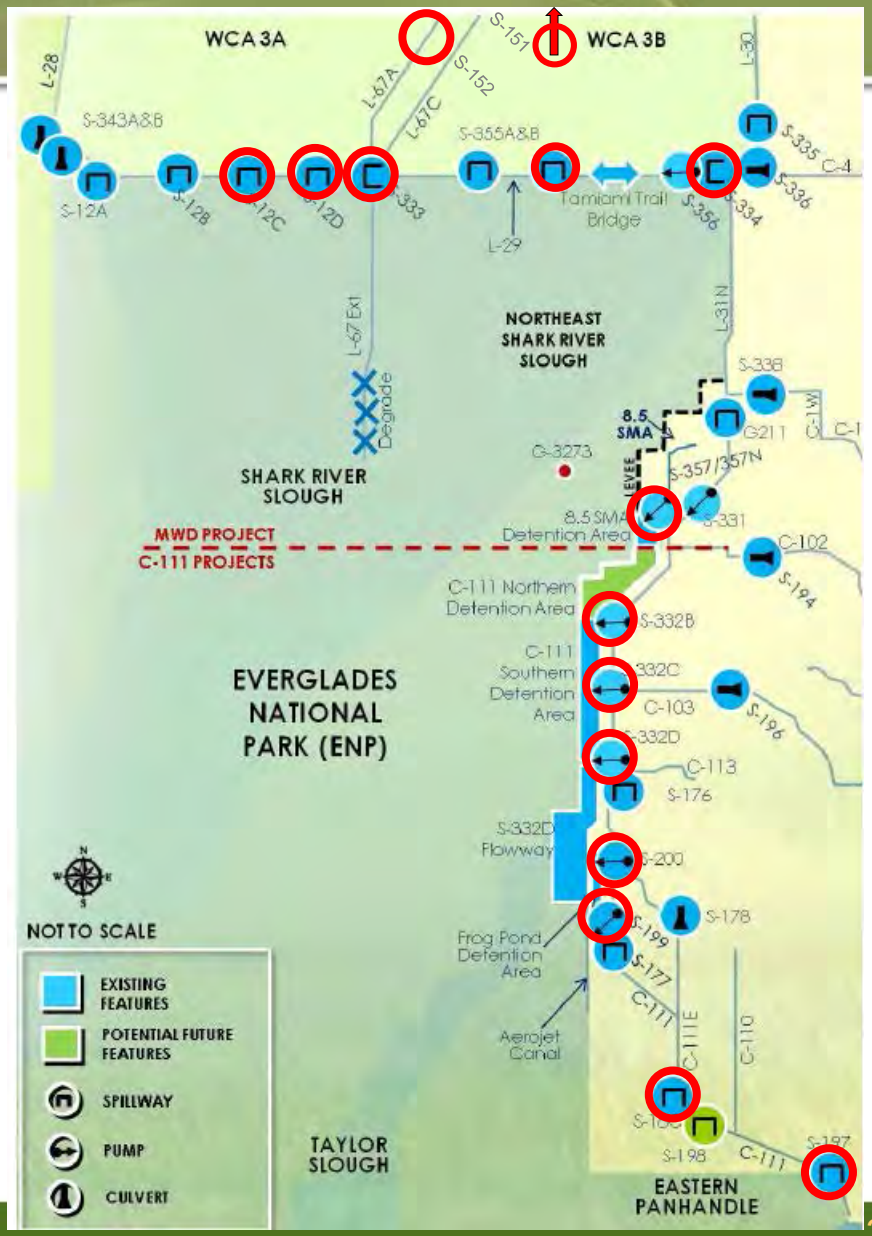
Total Phosphorus Concentration Comparison

February – May Periods

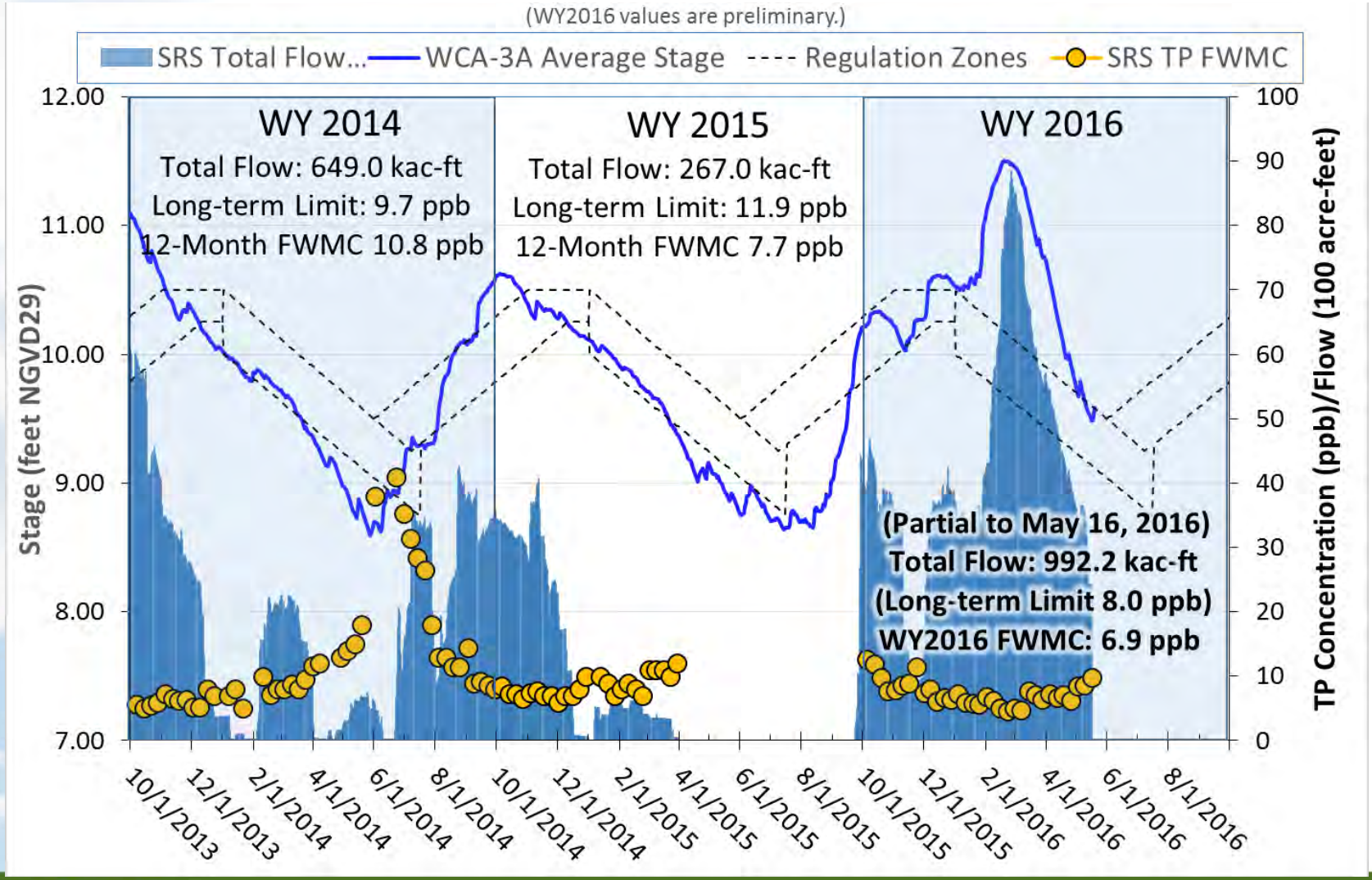




*S152 TP is Geometric Mean (no flow data)



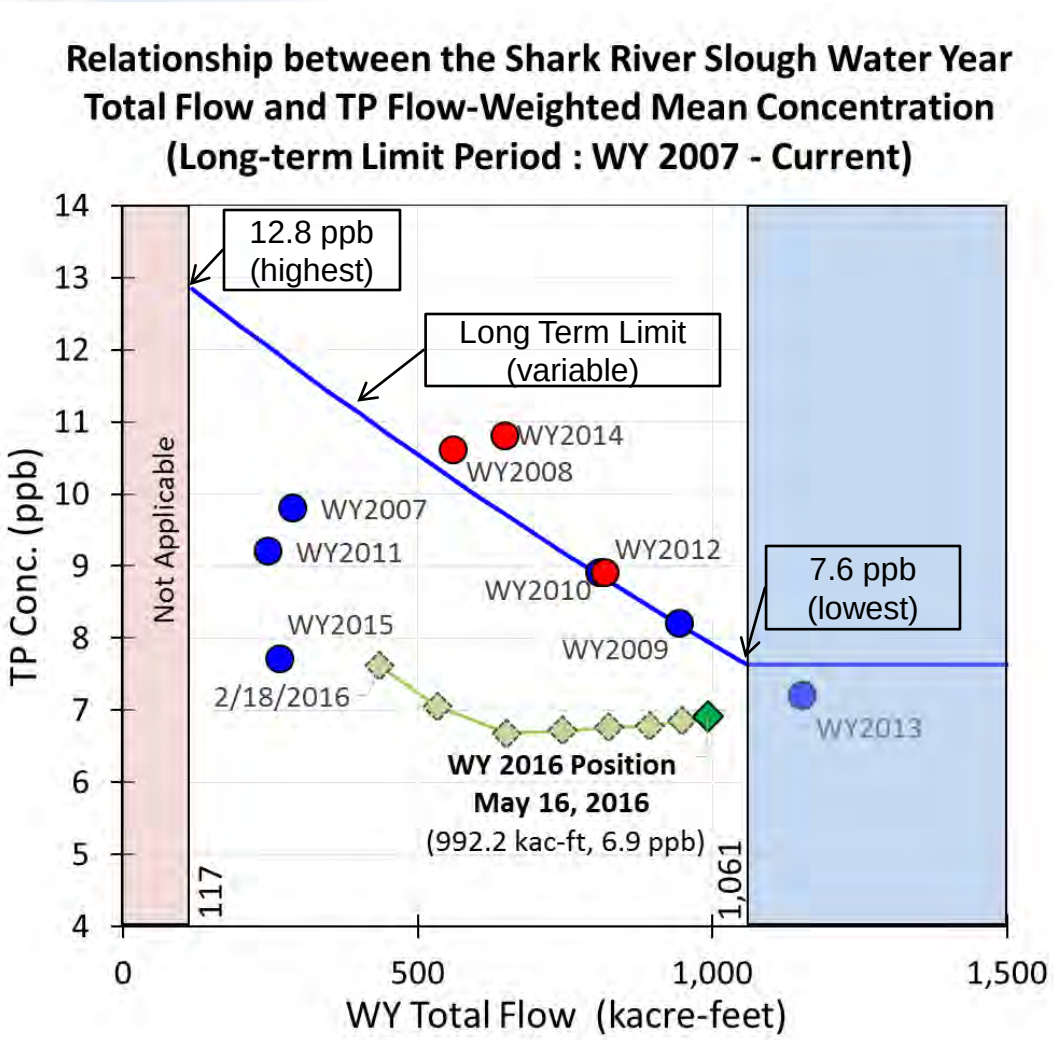
Water Level, Flow & Total Phosphorus Trends
Shark River Slough Water Years 2014 – 2016



Kac-ft = Acre-feet x 1000

WY2016 Provisional data included – Subject to change

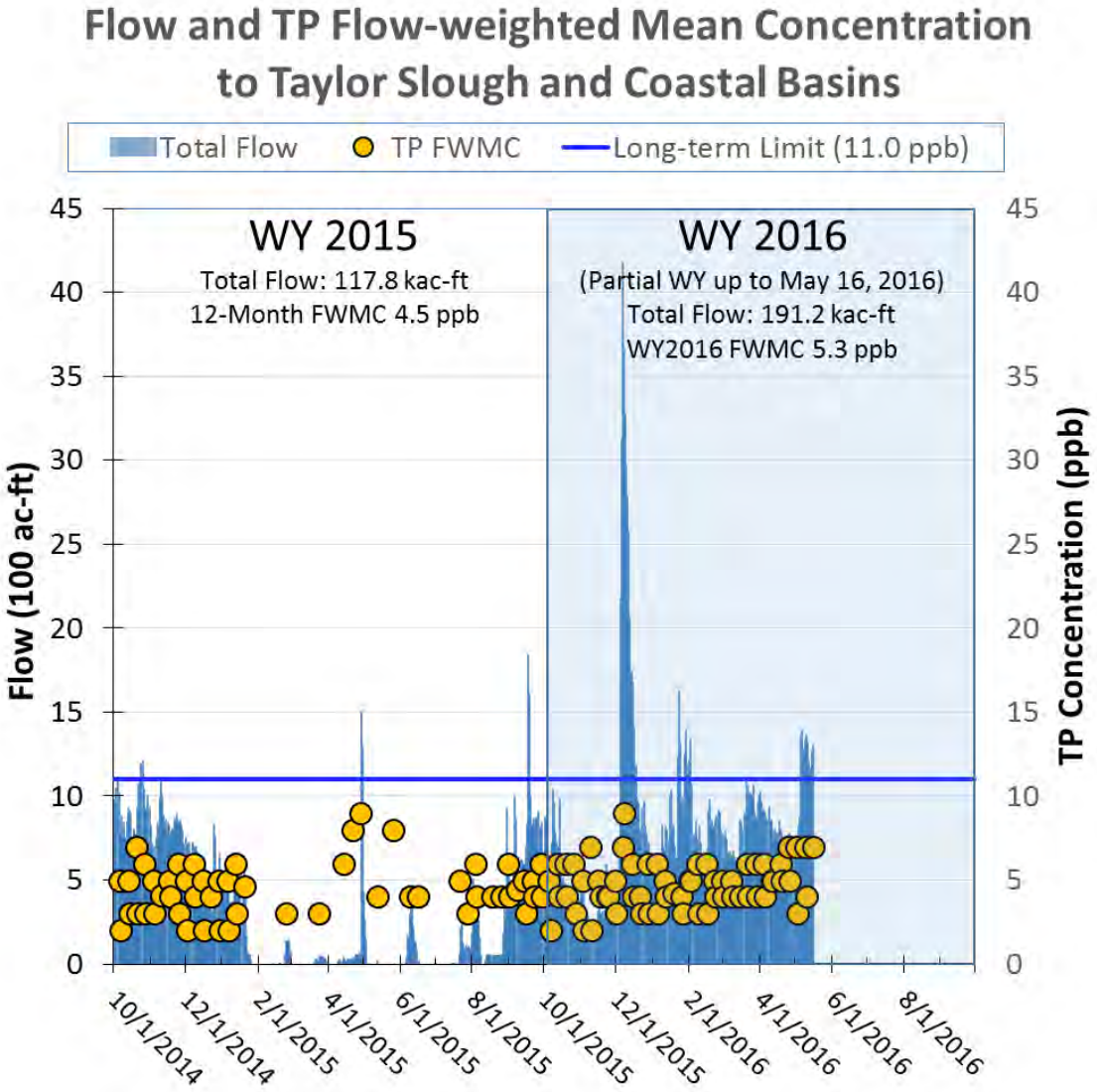
Shark River Slough Total Phosphorus Limit Equation



- Consent Decree compliance for Shark River Slough based on annual flow-weighted mean total phosphorus concentration
- Variable total phosphorus limit decreases as flow increases into Shark River Slough
- Lowest limit is 7.6 parts per billion for total annual flows >1,061 thousand acre-feet (likely for Water Year 2016)
- Federal Water Year 2016 ends Sept. 30, 2016 (four months remain in compliance period)

Provisional data included – Subject to change
1 ppb = 1 µg/L = 0.001 mg/L
kacre-feet = Acre-Feet x 1000

Taylor Slough/Coastal Basins
Flow and TP Trends WY2015 – WY2016



- Consent Decree compliance for Taylor Slough and Coastal Basins based on annual flow-weighted mean TP concentration
- The TP limit fixed at 11 ppb
- TP concentrations appear to be on trajectory for 5 - 6 ppb
- Federal WY2016 ends September 30, 2016 (four months remain in compliance period)

WY2016 Provisional data included – Subject to change
1 ppb = 1 µg/L = 0.001 mg/L
ac-ft = acre-feet, 1 kac-ft = 1,000 ac-ft

High Water Emergency After-Action Report Summary

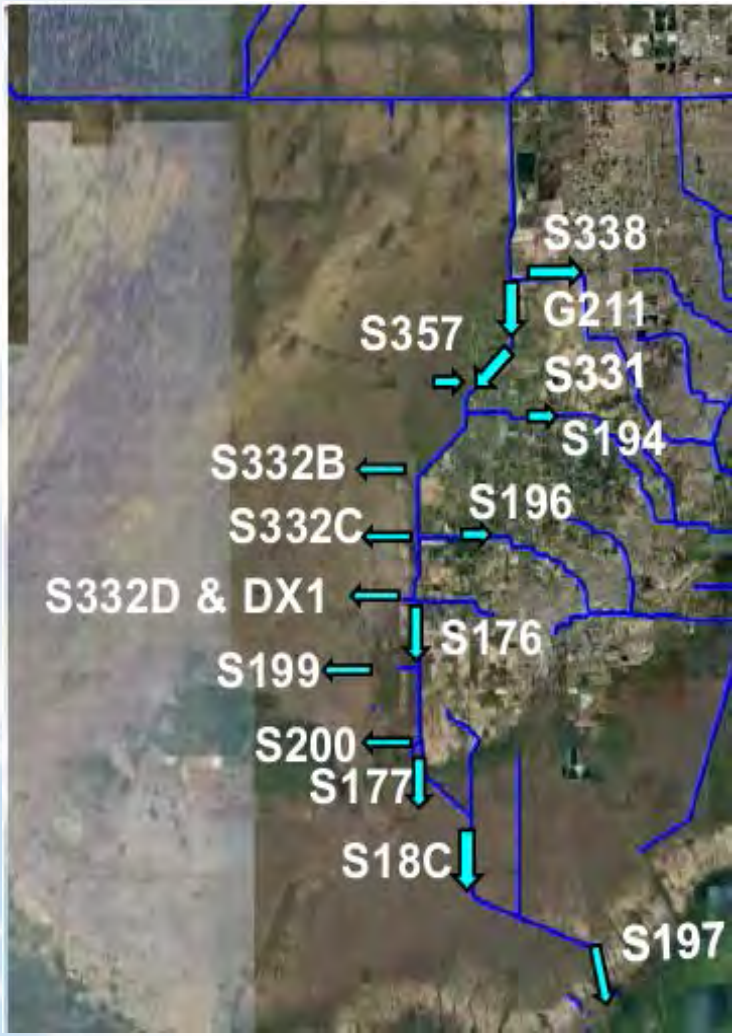
- Agency coordination throughout High Water Emergency Order period
- All Water Conservation Area stages significantly lowered
- Increased fresh water to Everglades National Park and Florida Bay
- Temporary and longer-term actions taken to mitigate for high water levels downstream
- SFWMD to submit After-Action Report to Florida Department of Environmental Protection by July 11, 2016

C) SOUTH DADE STUDY

Brenda Mills, Principal Scientist

Everglades Policy & Coordination

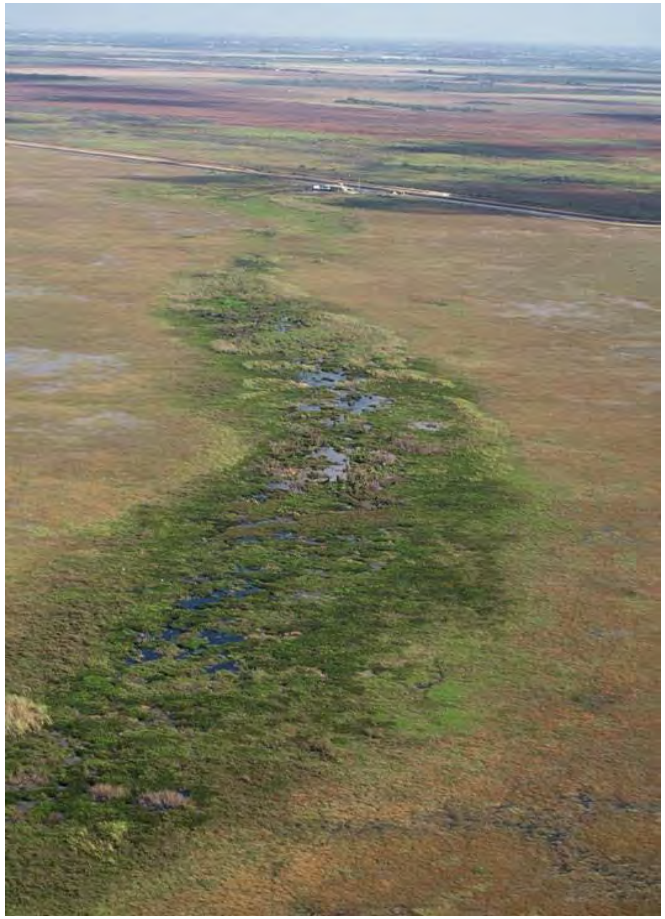
South Dade


S338
G211
S357
S331
S194
S332B
S196
S332C
S332D & DX1
S176
S199
S200
S177
S18C
S197


S-343A&B
S-12A
S-12B
S-12C
S-12D
S-333
L-67
S-355A&B
L-29
Tamiami Trail Bridge
S-334
S-335
S-336
L-31N
L-67 Ext
Degrade
8.5 SMA Levee
S-338
G211
G-3273
S-357
8.5 SMA STA
S-331
MWD Project
C-111 Projects
C-111 North Detention Area
S-332B
C-111 South Detention Area
S-332C
S-332D
S-176
EVERGLADES NATIONAL PARK
S-332D Flowway
S-200
S-332
S-177
S-199
Frog Pond Detention Area
C-111
EXISTING FEATURES
POTENTIAL FUTURE FEATURES
TAYLOR SLOUGH
S-18C
S-197
EASTERN PANHANDLE

South Dade Study Update

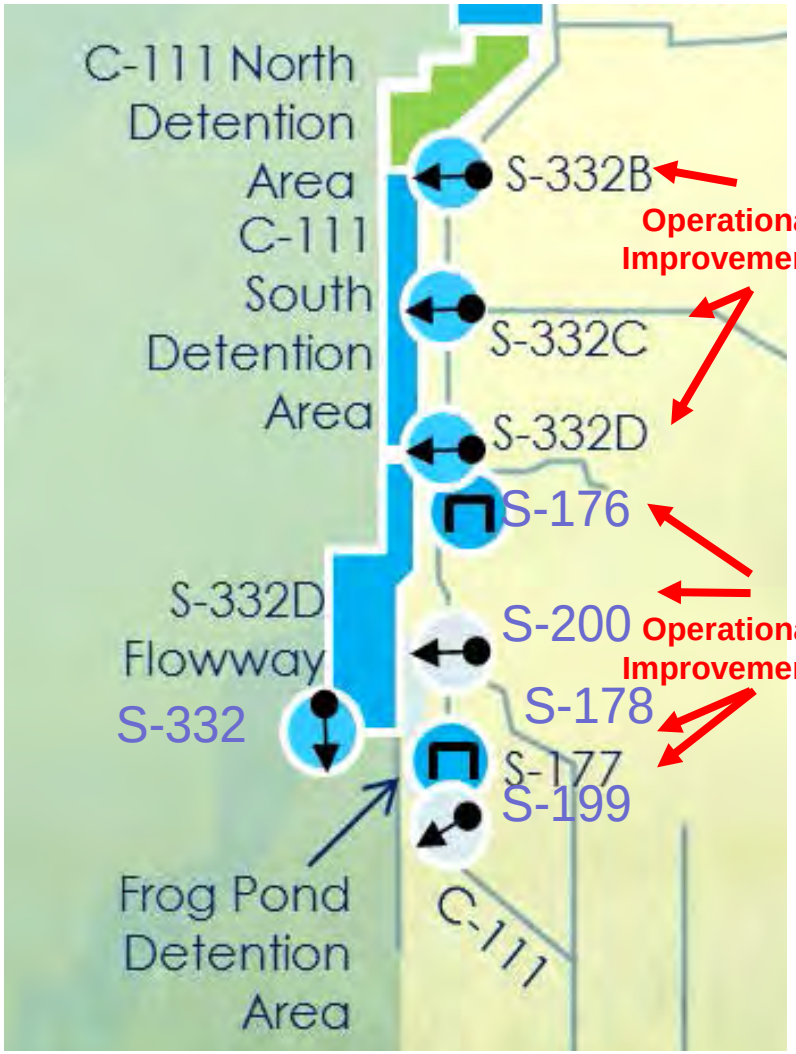
- In February 2016, SFWMD Governing Board instructed staff to implement components identified in the South Dade study.
- This presentation will provide an update on progress made towards near-term, mid-term and longer-term recommendations based on the complexity and regulatory requirements for implementation.



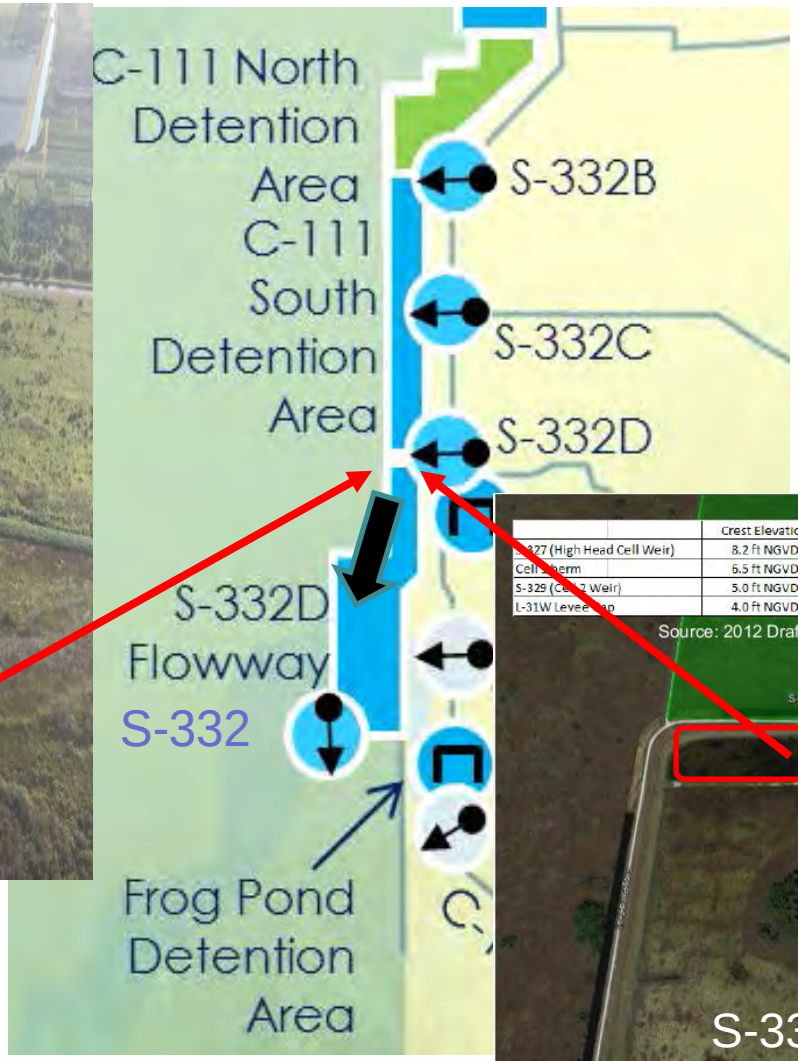
Taylor Slough, Everglades National Park

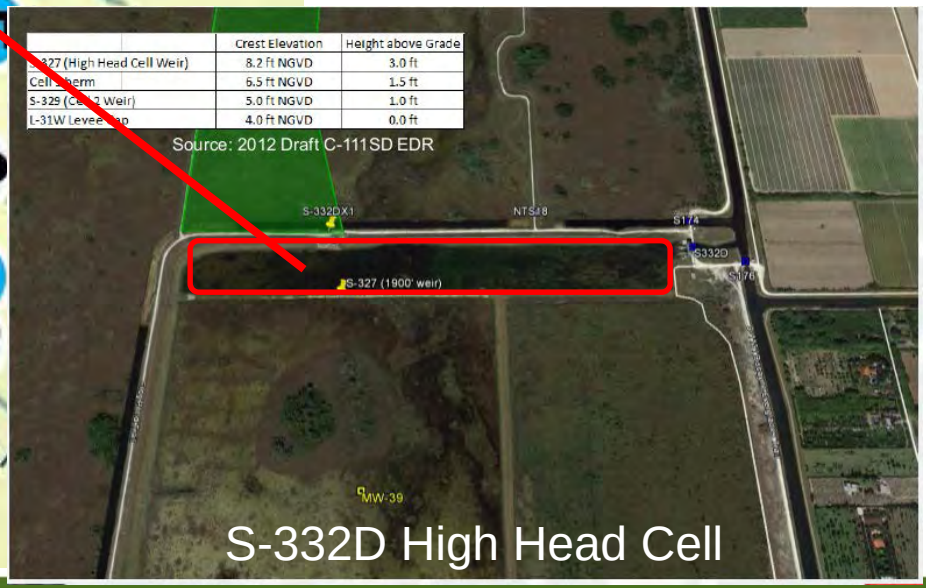
Near-Term Operational and Structural Recommendations

- ✓ Implemented operating guidance within existing water control plan authority
  - Operate the S-332B, S-332C, S-332D, S-199 and S-200 pumps at the lower end of their current operating range
  - Operate the water control structures S-176 and S-177 based on rainfall event criteria
- ✓ Seasonal and lower operating ranges at S-199 and S-200 pump stations
- ✓ Seasonal and lower operating ranges at S-332 pump stations, S-176 and S-177 structures
- ✓ Modify high head cell at S-332D



Modify S-332D High Head Cell Weir

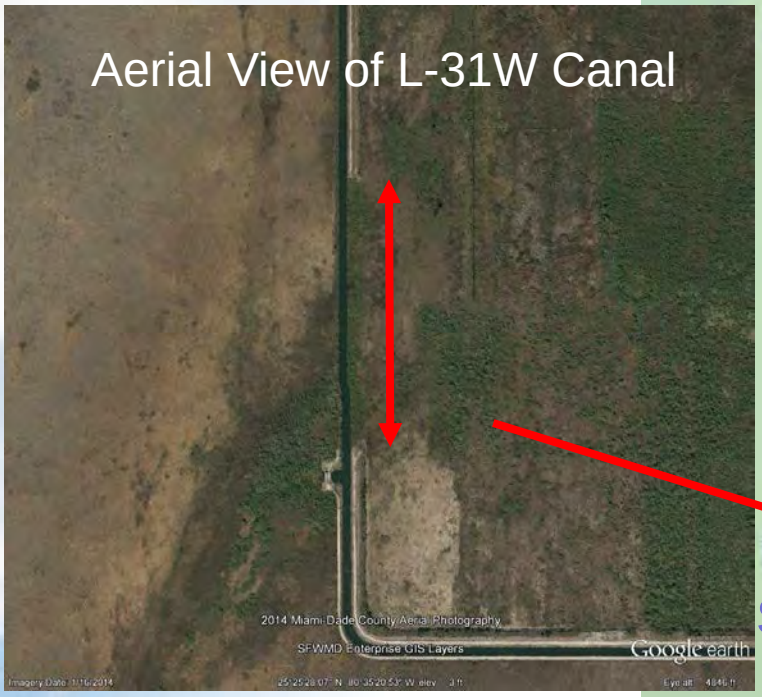




Mid-Term Structural Recommendations

- ✓ Increase S-199 and S-200 pump capacity
- ➢ Modify infrastructure in vicinity of Taylor Slough Headwaters
  - ✓ Rebuild weir north of S-332 on east side of canal
  - ✓ Staff has initiated a more detailed assessment of the hydraulic conveyance in the vicinity of Taylor Slough headwaters

Rebuild Weir Along L-31W Canal



Construction of C-111 South Dade Project

- Contract 8 construction by U.S. Army Corps of Engineers contractor is underway
- Contract 8A is expected to be awarded by U.S. Army Corps of Engineers in September 2016; Contract 9 to follow
- Once complete, the newly constructed flowways within the detention areas will move water more effectively

Longer-Term Structural Recommendations

- Seepage collection canal and pump stations near S-178
- Seepage barrier – up to 15 miles in length
- Both projects will require additional planning, permitting and design

Questions?